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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
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| 10/711,140 | 08/27/2004 | Ching-Hung Kao | NAUP0622USA | 5139 |

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| EXAMINER | |
|---|---|
| NGUYEN, TRAM HOANG | |
| ART UNIT | PAPER NUMBER |
| 2818 | |

DATE MAILED: 03/20/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

| Office Action Summary | Application No. | Applicant(s) | |
|---|---|---|---|
| | 10/711,140 | KAO, CHING-HUNG | |
| | Examiner | Art Unit | |
| | Tram H. Nguyen | 2818 | |

*-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --*

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

1)☒ Responsive to communication(s) filed on *09 February 2006*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

4)☒ Claim(s) *1-17* is/are pending in the application.

4a) Of the above claim(s) *4 and 15-17* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-3 and 5-14* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

**Application Papers**

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

**Response to Applicant's Arguments.**

***Claim Rejections - 35 USC § 102***

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless --
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

2. Claims 1-3 and 5-14 are rejected under 35 U. S. C. § 102 (e) as being anticipated by Gau et al. (U.S. Patent No. 6,882,029) (hereinafter Gau).

Regarding to **claim 1**, Gau discloses: a junction varactor (fig. 4) comprising: a gate finger (reference numeral 102) lying across an ion well of a semiconductor substrate (reference numeral 100); a gate dielectric (reference numeral 102b) situated between said gate finger and said ion well; a first ion diffusion region with first conductivity type (reference numeral 116) located in said ion well at one side of said gate finger, said first ion diffusion region serving as an anode of said junction varactor (reference notation Anode).

Gau also teaches a first lightly doped drain (LDD) having said first conductivity type in said ion well, and wherein said first LDD merges with said first ion diffusion region and extends laterally to said gate finger (col. 5, claim 2, lines 2-4); and a second ion diffusion region with a second conductivity type (reference numeral 112) located in

said ion well at the other side of said gate finger, said second ion diffusion region serving as a cathode of said junction varactor (reference notation Cathode).

Regarding to **claim 2**, Gau discloses all the limitations of the claimed invention; plus, the ion well has said second conductivity type (fig. 4, reference numeral 112; col. 5, lines 26-27).

Regarding to **claim 3**, Gau discloses all the limitations of the claimed invention for the reason above; furthermore, the said ion well is electrically isolated by shallow trench isolation (col. 4, lines 13-15).

Regarding to **claim 5**, Gau discloses all the limitations of the claimed invention for reason above; Gau further teaches a first/second lightly doped drain (LDD) having said first/second conductivity type in said ion well, and wherein said first/second LDD merges with said first/second ion diffusion region and extends laterally to said gate. (col.6, lines 26-30).

Regarding to **claim 6**, Gau discloses all the limitations of the claimed invention for reason above; moreover, Gau also teaches said junction varactor comprising a spacer located on sidewalls of said gates (col.6, lines 31-33; fig. 4, reference numeral 102a).

Regarding to **claim 7**, Gau discloses all the limitations of the claimed invention for reason above; and also disclose the said junction varactor comprising a salicide layer (fig. 4, reference numeral 103) formed on said gate and on said first and second ion diffusion regions(col. 3, lines 47-67).

Regarding to **claim 8**, Gau discloses all the limitations of the claimed invention for the reason above; except that Gau does not explicitly teach when operation, said gate of said junction varactor is biased to a gate voltage $V_G$ that is not equal to 0 volt. However, it refers to an operational limitation and any such limitation must distinguish from the prior art in terms of structure rather than function, In re Schreiber, 128 F.3d 1473, 1477-78, 44 USPQ2d 1429, 1431-32 (Fed. Cir. 1997); See also In re Swinehart, 439 F.2d210, 212-13, 169 USPQ 226, 228-29 (CCPA 1971; In re Danly, 263, F.2d 844, 847, 120 USPQ 528, 531 (CCPA 1959).

Regarding to **claim 9**, Gau discloses all the limitations of the claimed invention for the reason above; except for the said gate finger is a metal gate. It would have been an obvious matter of design choice to choose the gate material as metal or poly-silicon, since applicant has not disclosed that metal gate solves any stated problem or is for any particular purpose and it appears that the invention would perform equally well with metal/poly-silicon material.

Regarding to **claim 10**, Gau discloses all the limitations of the claimed invention for the reason above; and Gau furthermore teaches the said gate is a poly-silicon gate (col.3, line 36).

Regarding to **claim 11**, Gau discloses all the limitations of the claimed invention for the reason above; in addition, Gau also teaches said conductivity type is N type and said second conductivity type is P type (col.6, lines 19-21).

Regarding to **claim 12**, Gau discloses: A junction varactor (fig. 4) comprising:

An N well formed in a semiconductor substrate (reference numeral 100); a first gate finger lying across said N well (reference numeral 102); a first gate dielectric interposed between said first gate finger and said N-well (reference numeral 102b); second gate finger lying across said N well at one said of said first gate finger (reference numeral 101); second gate dielectric interposed between said second gate finger and said N-well (reference numeral 101b); a $P^+$ ion diffusion region located in said N well between said first and second gate fingers, said $P^+$ ion diffusion region (reference numeral 112) serving as an anode of said junction varactor.

Gau further discloses a P type lightly doped drain (PLDD) merging with said $P^+$ ion diffusion region (reference numeral 112) and extending to said first gate finger (reference numeral 102) and said second gate finger (reference numeral 101) (col.3, lines 33-36); a first $N^+$ ion diffusion region (reference numeral 116) located in said N well at one said of said first gate that is opposite to said $P^+$ ion diffusion region; and a second $N^+$ ion diffusion region (reference numeral 114) located in said N well at one said of said second gate that is opposite to said $P^+$ ion diffusion region, wherein said first $N^+$ ion diffusion region and said second $N^+$ ion diffusion region are electrically couple together and serve as a cathode of said junction varactor (col. 3, lines 56-58).

Regarding to **claim 13**, Gau discloses all the limitations of the claimed invention for the reason above except that Gau does not explicitly teach in operation, said first and second gate fingers of said junction varactor are biased to a gate voltage $V_G$ that is not equal to 0 volt. However, it refers to an operational limitation and any such limitation must distinguish from the prior art in terms of structure rather than function, In re

Schreiber, 128 F.3d 1473, 1477-78, 44 USPQ2d 1429, 1431-32 (Fed. Cir. 1997); See also In re Swinehart, 439 F.2d210, 212-13, 169 USPQ 226, 228-29 (CCPA 1971; In re Danly, 263, F.2d 844, 847, 120 USPQ 528, 531 (CCPA 1959).

Regarding to **claim 14**, Gau discloses all the limitations of the claimed invention for the reason above except for the gate voltage $V_G$ is $V_{CC}$. However, it refers to an operational limitation and any such limitation must distinguish from the prior art in terms of structure rather than function, In re Schreiber, 128 F.3d 1473, 1477-78, 44 USPQ2d 1429, 1431-32 (Fed. Cir. 1997); See also In re Swinehart, 439 F.2d210, 212-13, 169 USPQ 226, 228-29 (CCPA 1971; In re Danly, 263, F.2d 844, 847, 120 USPQ 528, 531 (CCPA 1959).

***Remark.***

3. In response to the communications dated 02/09/2006, claims 1-17 are active in this application.

Claim 4 has been cancelled.

Claims 15-17 have been withdrawn.

***Conclusion***

4. **THIS ACTION IS MADE FINAL**. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

5. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Tram H. Nguyen whose telephone number is (571)272-5526. The examiner can normally be reached on Monday-Friday, 8:30 AM – 5:00 PM. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David Nelms can be reached on (571)272-1787. The fax numbers for all communication(s) is (703)872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (571)272-1625.

David Nelms
Supervisory Patent Examiner
Technology Center 2800

THN

**Tram H. Nguyen**
Art Unit 2818
03/01/06